

**REMARKS**

Please reconsider the application in view of the above amendments and the following remarks. Applicant thanks the Examiner for carefully considering this application.

**Disposition of Claims**

Claims 1-4 and 12-14 are pending in this application. Claims 1 and 12 are independent. The remaining claims depend, directly or indirectly, from claims 1 and 12.

**Claim Amendments**

Claims 1 and 12 have been amended by way of this reply to clarify the present invention recited. No new matter has been added by way of these amendments.

**Rejection(s) under 35 U.S.C. § 112**

Claims 1-4 and 12-14 stand rejected under 35 U.S.C. § 112 as indefinite. To the extent that this rejection still applies to the claims as amended, the rejection is respectfully traversed.

As amended, claims 1 and 12 recite a method of forming drill bit bodies that includes inserting at least one displacement into a mold, where the displacement includes a substantially cylindrical body that has a diameter selected to conform to a radius of the cutting element and a projection that is adapted to form a relief groove. Claims 1 and 12 further recites infiltrating powdered tungsten carbide with a binder alloy in the mold, heating the tungsten carbide and binder alloy to the melting point of the binder alloy, forming from the inserted displacement, a mounting pad on the drill bit body for a cutting element, and forming from the projection, a relief groove in the drill bit body. The relief groove is formed in the drill bit body,

positioned under a diamond table of the cutting element when the cutting element is mounted on the pad. Claim 1 further recites that a width of the relief groove is selected so that the relief groove extends back from an outer surface of the drill bit body at least about 40 percent of that portion of a thickness of the diamond table which does not extend past the outer surface of the drill bit body.

Polycrystalline diamond compact (PDC) bits are a type of bit used to drill wellbores through earth formations. One way to manufacture PDC bit bodies is by casting. In the casting process, molds are created and filled with a mixture of tungsten carbide grains and a binder alloy. After creation of the drill bit body, cutting elements are mounted onto the drill bit body. Cutting elements are formed from natural and /or synthetic diamond, referred to as a diamond table, affixed to a cylindrical tungsten carbide substrate.

In order to affix the cutting elements to the drill bit body, mounting pads must be created on the drill bit body. The claimed invention uses substantially cylindrical displacements affixed to the mold during the casting process to create mounting pads on the drill bit body. In addition to the displacement creating a mounting pad, a projection that extends out of the displacement creates a relief groove within the drill bit body. More specifically, the claimed invention manipulates the size of the projection based on the thickness of the diamond table and how much the diamond table extends past the surface of the bit body to create a relief groove that will best reduce diamond table breakage and failure of the bit. As explained on pages 6-7 of the specification, in the invention has determined that diamond table breakage is reduced efficiently when the width of the relief groove is selected so that the groove extends back at least 40 percent of that portion of the diamond table which does not extend past the edge of the blade, the part of the drill bit body which includes one or more of the mounting pads. The Applicant

respectfully submits that one of ordinary skill would recognize how drill bit bodies could be made by the methods specified in claims 1 and 12 to create a drill bit with increased bit life. Accordingly, withdrawal of the §112 rejections is respectfully requested.

**Rejection(s) under 35 U.S.C. § 102**

Claims 1 and 12 stand rejected under 35 U.S.C. § 102 as anticipated by U.S. Patent No. 4,844,185 (“Newton”). To the extent that this rejection still applies to the claims as amended, the rejection is respectfully traversed.

Claims 1 and 12 recite a method of forming drill bit bodies that includes inserting at least one displacement into a mold, infiltrating powdered tungsten carbide with a binder alloy in the mold, heating the tungsten carbide and binder alloy to the melting point of the binder alloy, forming, from the inserted displacement, a mounting pad on the drill bit body for a cutting element, and forming a relief groove in the drill bit body. The displacement includes a substantially cylindrical body that has a diameter selected to conform to a radius of the cutting element and a projection that is adapted to form the relief groove. The relief groove is formed in the drill bit body, positioned under a diamond table of the cutting element when the cutting element is mounted on the pad.

Newton discloses a rotary drill bit comprised of a bit body having a leading face and a gauge region, cutting elements mounted at the leading face of the bit body, and a passage in the bit body for supplying drilling fluid to the face.

Newton fails to disclose inserting displacements into a mold in forming a drill bit body, so that mounting pads and relief grooves may be formed on or in the drill bit body. Newton is silent as to forming a drill bit body using displacements. Rather, Newton simply

recites that a drill bit body is typically formed of carbide matrix infiltrated with a binder alloy (col 4, lines 25-26). The Applicant is unaware of any disclosure in Newton and the Examiner has failed to show any disclosure in Newton that recites all of the elements required by claims 1 and 12. Therefore, claims 1 and 12 are not anticipated by Newton.

To the extent that the Examiner believes that the recited limitations regarding the mold and displacements of claims 1 and 12 do not affect the method in a manipulative sense; and therefore, should be given little patentable weight, the Applicant respectfully notes that the instant claims and limitations are wholly distinguishable from those at issue in *Ex parte Pfeiffer*, 135 U.S.P.Q. 31 (Pat. & Tr. Office Bd. App. 1961), the case relied upon by the Examiner to support this proposition. In *Pfeiffer*, the appealed claims related to a process of delivering fluid materials from air vehicles to the ground in a freely falling, flexible, and extendable bag without the use of parachutes. *Id.* at 31-32. The claims further recited structural limitations relating to the physical characteristics of the bag used in the method. *Id.* As emphasized by the Board, while the claimed bag possessed features not shown in the cited references, the court found those features not to be attributes of manipulative steps, but rather of the prescribed unchangeable law of operation of the bag's structure. *Id.* Accordingly, those structural features were given little patentable weight. *Id.*

The Applicant asserts that the facts of *Pfeiffer* are inapposite to those of the instant application. Unlike *Pfeiffer*, the claimed limitations specifying the at least one displacement within the mold in which powdered tungsten carbide is infiltrated are indeed attributes of the manipulative steps of infiltrating powdered tungsten carbide with a binder alloy to form a drill bit body. The dimensions and placement of the displacement affect how the powdered tungsten carbide is manipulated to form a mounting pad and relief groove in the drill

bit body. In other words, the dimensions and placement of the displacement are structural limitations that affect the claimed method in a manipulative sense.

As such, the instant claim limitations are similar to those at issue in *Ex parte Holderness*, 2002 WL 130554 (Bd. Pat. App. & Interf.). In *Ex parte Holderness*, the appealed method claims recite, *inter alia*, placing graphite having a metal contaminant adhered thereto into a bath, where the graphite is contained in one or more baskets having at least a base which has a grill or perforations. *Id.* at \*1. The Examiner rejected the claims, citing *Ex parte Pfeiffer* to support the proposition that the placement of the graphite into the basket having the specific structural limitations of at least a base which has a grill or perforations did not affect the claimed method in any manipulative sense. *Id.* at \*2. The Board, however, reversed the Examiner, giving the structural limitations patentable weight because “the presence of a basket having a base with a grill or perforations unquestionably would affect how the scrap graphite and particles falling therefrom would be manipulated during practice of the appellants’ claimed method.” *Id.*

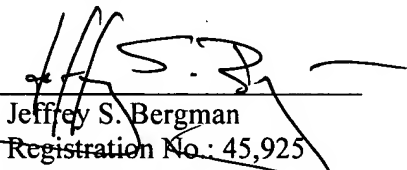
Similar to *Holderness*, the presence of the mold and the at least one displacement therein with the particular dimensions and placement unquestionably affects how powdered tungsten carbide within the mold would be manipulated during the infiltration of the tungsten carbide with the binder alloy. Thus, the structural limitations concerning the mold and displacement, as recited in claims 1 and 12, are entitled to patentable weight in determining the patentability of claims 1 and 12 in view of Newton under § 102. Thus, because Newton fails to disclose using displacements during the infiltration of powdered tungsten carbide in a mold to form a drill bit body, so that the displacements will create mounting pads and relief grooves within the drill bit body, claims 1 and 12, and all claims depending therefrom, are patentable over Newton. Accordingly, withdrawal of the rejection is respectfully requested.

**Conclusion**

Applicant believes this reply is fully responsive to all outstanding issues and places this application in condition for allowance. If this belief is incorrect, or other issues arise, the Examiner is encouraged to contact the undersigned or his associates at the telephone number listed below. Please apply any charges not covered, or any credits, to Deposit Account 50-0591 (Reference Number 05516/084002).

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Respectfully submitted,

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